
त्रिज्य गेट और रज्जू ड्रम उच्चालकों
के निरीक्षण, परीक्षण और
रख-रखाव की सिफारिशें

भाग 1 निरीक्षण, परीक्षण और विनिर्माण के
स्तर पर असेम्बली
अनुभाग 2 रज्जू ड्रम उच्चालकों
(पहला पुनरीक्षण)

**Recommendations for Inspection,
Testing and Maintenance of
Radial Gates and Rope
Drum Hoists**

Part 1 Inspection, Testing and Assembly at the
Manufacturing Stage
Section 2 Rope drum hoists
(*First Revision*)

ICS 93.160

© BIS 2014



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Hydraulic Gates and Valves Sectional Committee had been approved by the Water Resources Division Council.

This standard was first published in 1986, however, the Committee responsible for the formulation of this standard decided to revise it based on the experience gained since then as well as considering technological development in the field.

This standard is being published in three parts. Other Parts in the series are:

- (Part 2) Inspection and testing at the time of erection,
- (Part 3) Inspection, testing and maintenance after erection.

This Part is being published in two sections. Section 1 of this Part covers the gates.

Hoists are very important so far as the operation of the gates are concerned but one redeeming feature is that the hoists are always approachable since they are above water. Before the floods, the hoist should also be checked carefully.

Reference to the following Indian Standards will be found useful in implementation of this standard:

<i>IS No.</i>	<i>Title</i>
210 : 2009	Grey iron castings — Specification (<i>fifth revision</i>)
306 : 1983	Specification for tin bronze ingots and castings (<i>third revision</i>)
318 : 1981	Specification for leaded tin bronze ingots and castings (<i>second revision</i>)
816 : 1969	Code of practice for use of metal arc welding for general construction in mild steel (<i>first revision</i>)
1030 : 1998	Carbon steel castings for general engineering purposes — Specification (<i>fifth revision</i>)
2004 : 1991	Carbon steel forgings for general engineering purposes — Specification (<i>third revision</i>)
2062 : 2011	Hot rolled low, medium and high tensile structural steel (<i>seventh revision</i>)
2595 : 2008	Industrial radiographic testing — Code of practice (<i>second revision</i>)
3664 : 1981	Code of practice for ultrasonic pulse echo testing by contact and immersion methods (<i>first revision</i>)
3973 : 1984	Code of practice for the selection, installation and maintenance of wire ropes (<i>first revision</i>)
5530 : 2005	Recommendations for production rectification and repair of steel castings by metal arc welding process (<i>second revision</i>)
6938 : 2005	Design of rope drum and chain hoists for hydraulic gates — Code of practice (<i>second revision</i>)

In reporting the result of a test or analysis made in accordance with this standard, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

RECOMMENDATIONS FOR INSPECTION, TESTING AND MAINTENANCE OF RADIAL GATES AND ROPE DRUM HOISTS

PART 1 INSPECTION, TESTING AND ASSEMBLY AT THE MANUFACTURING STAGE

Section 2 Rope Drum Hoists

(*First Revision*)

1 SCOPE

1.1 This standard (Part 1/Sec 2) lays down the recommendations for inspection, testing and assembly of rope drum hoists for radial gates at the manufacturing stage.

1.2 This standard may be applicable for rope drum hoists for other types of gates as well.

2 REFERENCES

2.1 The standards listed below contain provisions which, through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No.</i>	<i>Title</i>
325 : 1996	Three-phase induction motors — Specification (<i>fifth revision</i>)
919	ISO Systems of limits and fits:
(Part 1) : 1993	Bases of tolerance, deviations and fits (<i>second revision</i>)
(Part 2) : 1993	Tables of standard tolerance grades and limit deviations for holes and shafts (<i>first revision</i>)
1573 : 1986	Specification for electroplated coatings of zinc on iron and steel (<i>second revision</i>)
4460 (Parts 1 to 3) : 1995	Gears — Spur and helical gears — Calculation of load capacity (<i>first revision</i>)
14177 : 1994	Guidelines for painting system for hydraulic gates and hoists

3 GENERAL

3.1 All materials and components used for the work shall be new and free from defects and subject to the specified tolerances.

3.2 Complete inspection of the hoists shall be made at the place of manufacture prior to dispatch.

3.3 All hoists shall be fully assembled and tested under no load condition at the shop. If specified by the purchaser, at least one hoist assembly is to be tested for designed forces coming on the rope drum corresponding to 125 percent of the hoist capacity.

4 MATERIALS

4.1 All materials and components supplied by the manufacturer shall conform to the requirements of the latest relevant Indian Standards. In the absence of any Indian Standard for any particular material or component, other specification, as mutually agreed to between the purchaser and the supplier, may be used.

4.2 All materials used shall be of tested quality and original manufacturer's test certificates for bought out items such as structural steel, castings, forgings, worm reducers, wire ropes, motors and brakes, etc, shall be furnished by the hoist manufacturer on demand.

4.3 Castings

4.3.1 All castings shall conform to the relevant Indian Standards.

4.3.2 Visual examination should be done to find out the general soundness of castings and if required, these may be subjected to non-destructive tests such as ultrasonic test.

4.3.3 Repairs of major defects in castings by welding shall not generally be allowed, but if the strength and machinability of the casting can be ensured, the repairing may be undertaken with the approval of the purchaser.

4.3.4 Defective castings as permitted under **4.3.3** shall be heat-treated after repairs by welding, where deemed essential.

4.4 Forgings

4.4.1 All forgings shall conform to the latest relevant Indian Standards.

4.4.2 All forgings shall be suitably heat-treated according to relevant Indian Standards.

4.4.3 Visual inspection of forgings shall be done and the finished surface shall be smooth and free from defects. If required, non-destructive tests such as ultrasonic test shall be conducted on the forgings.

5 WELDING

5.1 All welding shall conform to the relevant Indian Standards and approved electrodes shall be used.

5.2 Welding procedure for all major welds shall be drawn up and carried out and if required by the purchaser, test pieces may be made to ensure the soundness of the welding.

5.3 Only tested welders shall be employed for the welding work.

5.4 Visual examination shall be carried out of all welded joints to ensure that welding is free from the following:

- a) cracks on the surfaces of the joints or parent metals located near the heat affected zones;
- b) undercuts in the parent metals;
- c) non-uniform width of fillet joints;
- d) misalignment and distortion of the welded member; and
- e) irregular reinforcing beads of welds.

5.4.1 Welds found to be defective shall be subjected to non-destructive tests to ensure soundness of welding.

5.5 Proper sequence of welding shall be followed for welding of heavy structural parts in order to minimize distortion.

5.6 Defective welds after testing shall be removed and re welded.

5.7 All major stress carrying welded joints shall be subjected to suitable non-destructive testing, as specified by the purchaser.

6 HOIST UNIT OF GATE

6.1 Components of hoist as given below shall be inspected:

- a) drive unit consisting of gear box, motor, brake, all mounted on a base frame;
- b) hoist drum and gear reduction unit mounted on a base frame and connected to drive unit by line shafts, limit switches and dial indicators;

- c) hoist ropes, rope fixtures with accessories;
- d) arrangement for manual operation of gate;
- e) control panel; and
- f) any other component.

6.1.1 Drive Unit Gear Box

It shall be checked for proper sealing arrangement of the shafts and oil in gear box.

6.1.2 Hoist Motor

It shall be of approved manufacture, capacity, insulation and speed (rpm). It shall conform to IS 325 unless otherwise specified and shall be checked at hoist manufacturer's premises. Manufacturer's test certificate shall be furnished for motor.

6.1.3 Brake

It shall be of approved manufacture and capacity. It shall be checked for alignment and tightness. Brake liners shall be of approved manufacture and shall conform to approved specification.

6.1.4 Base Frame

The base frame for mounting of drive unit/gear reduction unit with hoist drum shall be checked for dimensional accuracy.

6.1.5 Hoist Drum

It shall be checked for dimensional accuracy. Cast iron/cast steel drums shall be checked for blow holes, cracks, etc, specially at groove centers. Fabricated drums shall be checked for stress-relieving in approved manner. Rope grooves shall be checked for orientation. Arrangement of rope attachment to the drum shall be checked for securing.

6.1.6 Reduction Unit Gear Box

It shall be checked for proper assembly, dimensional accuracy, sealing, finish of machined parts, and surface preparation and painting. Gears, pinions and other internals shall be checked for alignment. Meshing of gear and pinion teeth shall be checked for alignment. It shall also be checked for contact surface and backlash by suitable methods such as applying a thin film of paint or grease on either the pinion or gear wheel and running the assembly and noting the impression. Gears and pinions shall be checked for hardness. Tolerances of gears and pinions shall conform to IS 919 and backlash shall conform to IS 4460.

6.1.7 Line Shaft

It shall be checked for straightness and other dimensions. The straightness shall be in accordance with relevant Indian Standard. Mounting of couplings on line shafts shall be checked for alignment.

6.1.8 Limit Switch

It shall be checked for satisfactory operation. It shall be weatherproof.

6.1.9 Dial Indicator

It shall be checked for satisfactory operation and accuracy.

6.1.10 Hoist Ropes

It shall be of approved manufacture and shall conform to relevant Indian Standards. The ropes shall be checked for diameter, length, freedom from twists and kinks, proper thimble end connections and splicing. If the ropes are of galvanized type, galvanization shall be in accordance with Class II of IS 1573. Manufacturer's test certificate shall be furnished for hoist ropes.

6.1.11 Rope Fixtures

These shall be checked for dimensional accuracy and their correctness.

6.1.12 Arrangement for Manual Operation of Gates

It shall be checked for satisfactory operation. It shall be ensured that the gates are kept at required position during their travel and for specified speed as envisaged in the design.

6.1.13 Control Panel

Panels shall be checked for their suitability for the purpose envisaged. The checks may include items such

as weatherproofing of conducting wires. If specified, proper construction of panels, high voltage test, insulation resistance of cable, calibration of meters, if any and checking of connections shall be done.

7 LUBRICATION OF GEARS AND BEARINGS

7.1 For gears and pinions, lubricating oil/grease or lubricating compound used shall be of approved grade and quality.

7.2 Bearings closed from outside and open from inside shall be checked for splash lubrication and bearing covers shall be free from leakage. For bearings closed from both sides, proper injection of grease of approved quality and grade shall be checked.

8 INSPECTION ON ASSEMBLY

8.1 The assembled hoist shall be checked for the following:

- a) Quality of workmanship,
- b) Overall dimensions,
- c) Optimum sound and vibrations,
- d) Speed of operation allowing for variation in accordance with Indian Standards, and
- e) Any mechanical jamming.

9 PAINTING

Painting of different components of hoist shall be as per IS 14177.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: WRD 12 (0576).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 2323 0131, 2323 3375, 2323 9402

Website: www.bis.org.in

Regional Offices:

Telephones

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

{ 2323 7617
2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi
KOLKATA 700054

{ 2337 8499, 2337 8561
2337 8626, 2337 9120

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 260 3843
260 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113

{ 2254 1216, 2254 1442
2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093

{ 2832 9295, 2832 7858
2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KOCHI. LUCKNOW. NAGPUR.
PARWANOO. PATNA. PUNE. RAJKOT. VISAKHAPATNAM.